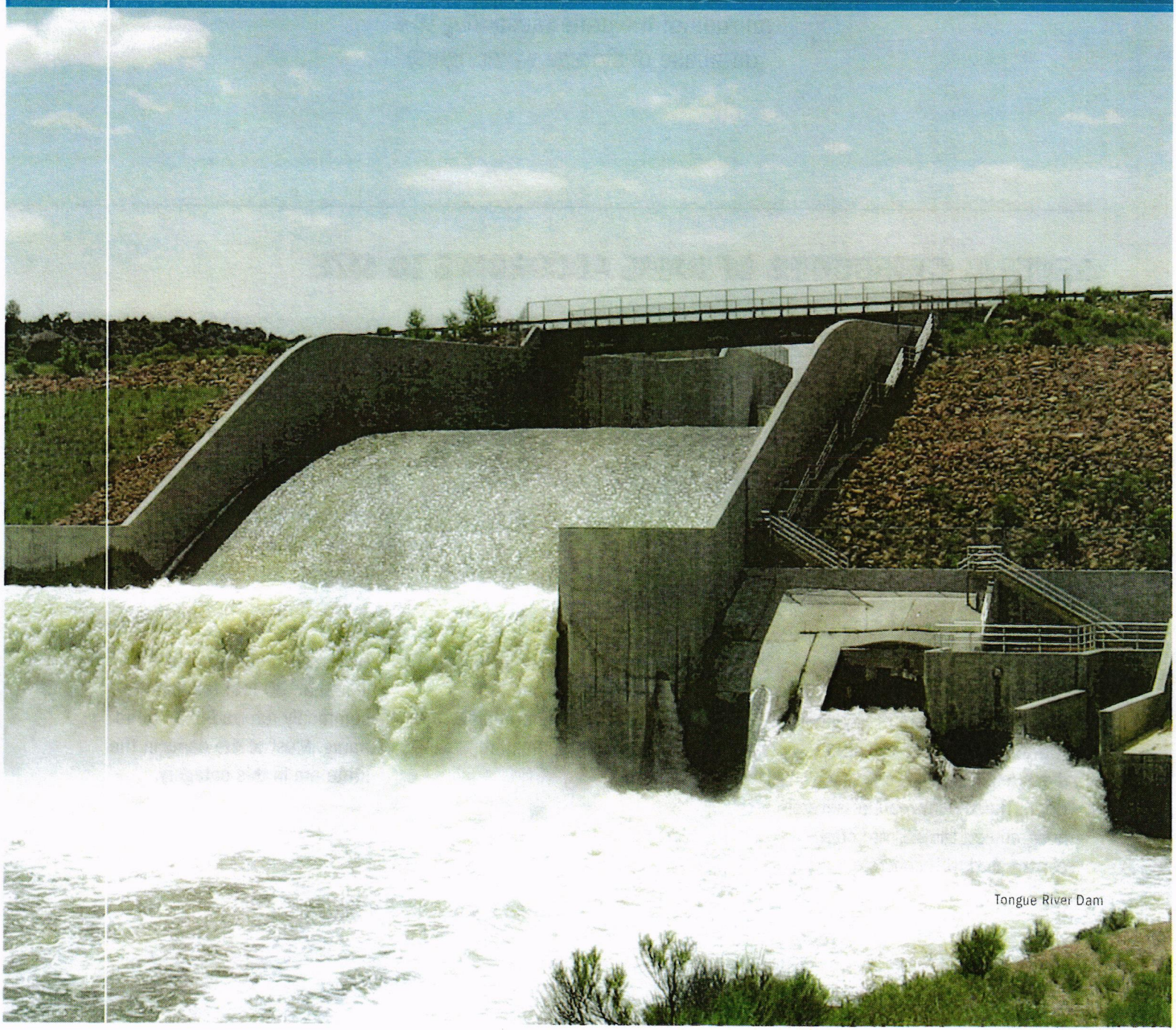
FEMA

MONTANA DNRC

Region VIII

Dams in Montana

JULY 2018



Tongue River Dam

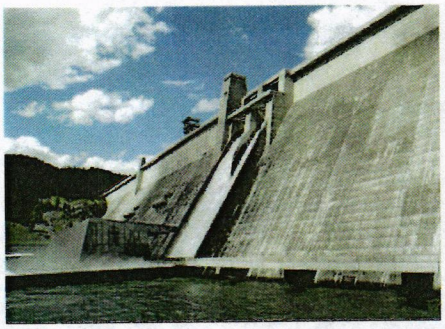
Dams in Montana

FEMA

MONTANA HAS OVER 64,000 RESERVOIRS,

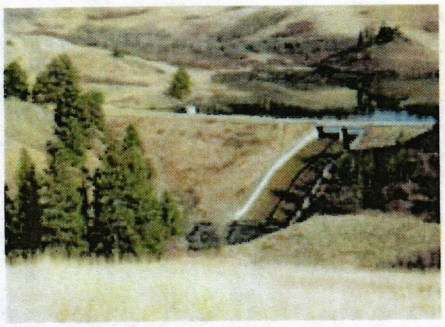
the vast majority located in the eastern portion of the state (according to a database of storage water rights).

GENERAL CATEGORIES OF DAMS ACCORDING TO SIZE



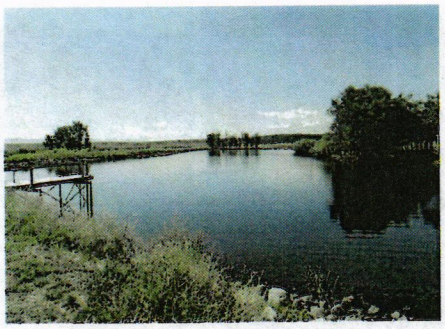
LARGE

Generally, these dams are the US Bureau of Reclamation (USBR) and US Corp of Engineers (USACE) owned and operated dams (e.g., Canyon Ferry, Libby Dam). These dams can be several hundred feet tall and are often constructed with concrete.



MEDIUM

Typically, these dams are between 30 and 150 feet tall and are usually of earthen construction. (e.g., Bearpaw Dam, Painted Rocks Dam)



SMALL

Generally, these dams are less than 30 feet tall and are commonly referred to as pond dams. Most of the dams in the state are in this category.

Dams in Montana

FEMA

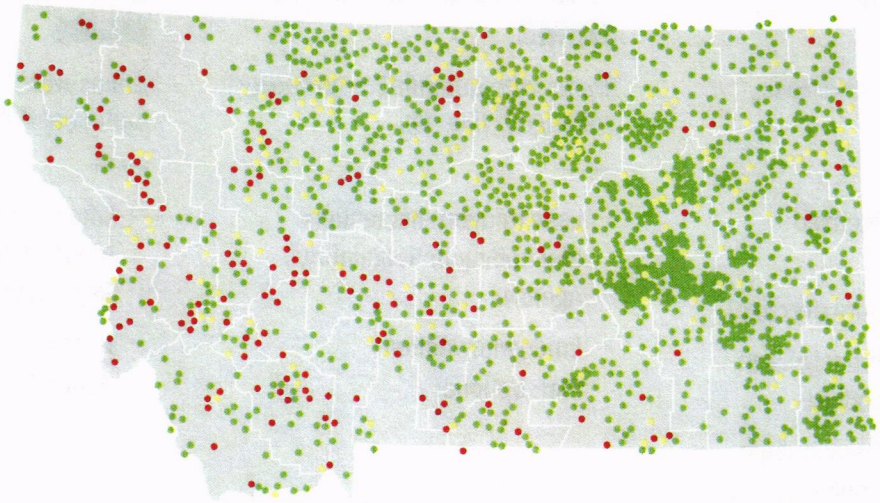
CATEGORIES OF DAMS ACCORDING TO RESERVOIR CAPACITY

Dams are further categorized by reservoir capacity: Reservoirs with a capacity under 50 acre-feet are generally considered to be too small to pose a threat to public health and safety if they fail. There are 3,669 dams with a capacity of 50 acre-feet or greater, according to Montana's National Dam Inventory (January 2018).

In the water world, water is commonly measured in acre-feet. One acre-foot equals about 326,000 gallons, or enough water to cover an acre of land, about the size of a football field, one foot deep. So, an area of 1 acre about 50 feet deep would be 50 acre-feet.

CATEGORIES OF DAMS ACCORDING TO HAZARD TO DOWNSTREAM POPULATION, PROPERTY AND INFRASTRUCTURE

SNAPSHOT OF MONTANA'S DAM INVENTORY:



HIGH HAZARD DAMS (197)
Failure may cause loss of human life

SIGNIFICANT HAZARD DAMS (201)
Failure may cause significant property damage, but loss of life is not expected.

LOW HAZARD DAM (3271)
Failure causes minimal property damage, usually limited to property owned by dam owner.

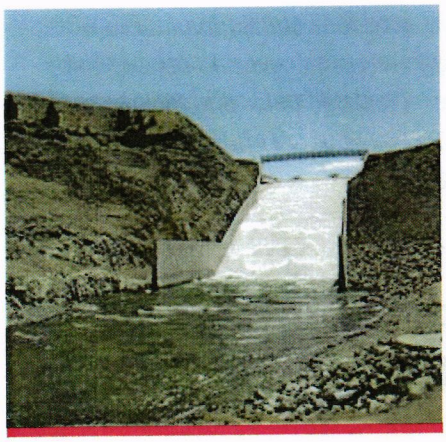
When defining the *Hazard Classification* of dams, the condition or integrity of the dam is not considered, only the potential for damage and loss of life should the dam fail. In other words, it doesn't matter if the dam is in excellent or poor shape.

Note: Dams on small ponds with a capacity under 50 acre-feet generally do not have a Hazard Classification assigned.

Dams in Montana

FEMA

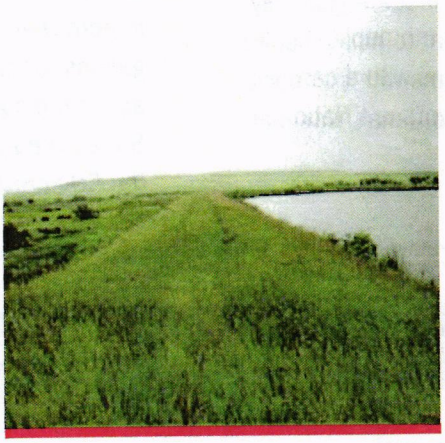
MONTANA REQUIREMENTS FOR DAMS ACCORDING TO HAZARD CLASSIFICATION



HIGH-HAZARD DAMS

Dams with potential for loss of life if they fail

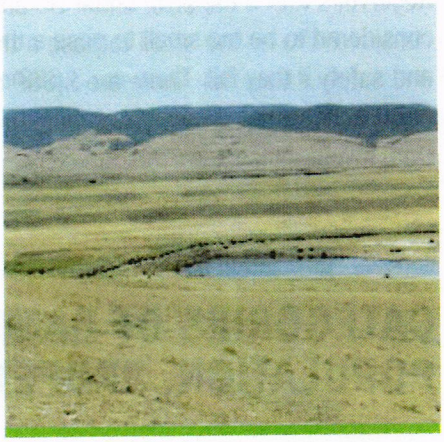
- Inspections by licensed engineer
- Stringent regulatory oversight
- Compliance with design and construction standards
- Designed to withstand large floods and earthquakes without failing
- Emergency Action Plan to evacuate downstream residents required
- Operation and maintenance plans required



SIGNIFICANT-HAZARD DAMS

Dams with potential for property damage if they fail

- Less frequent Inspections (depending on Regulatory Agency)
- Emergency Action Plan optional



LOW-HAZARD DAMS

Dams with low damage potential if they fail

- Often not Inspected (depending on Regulatory Agency)
- Rarely have an Emergency Action Plan

LIABILITY OF DAM OWNERSHIP

In Montana, regardless of classification, the dam owner – and in some cases the land owner (if different) – are responsible for ensuring the dam is in a safe condition.

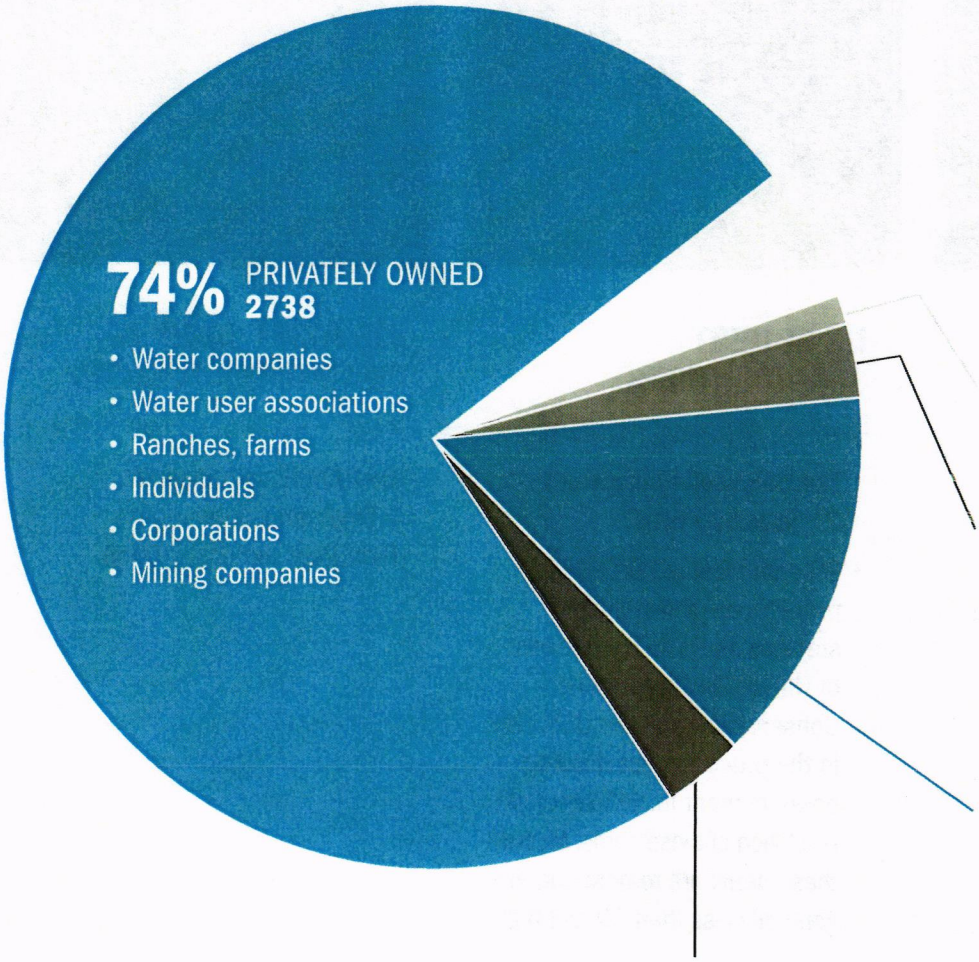
Responsible dam ownership includes attention to maintenance, repair, careful operation, periodic inspection as well as compliance with all applicable laws.

For more information on the Liability of Dam Ownership in Montana refer to: http://dnrc.mt.gov/divisions/water/operations/dam-safety/LegalLiabilityDamOwnership.pdf

Dams in Montana

FEMA

OWNERSHIP OF MONTANA'S DAMS
(WITH RESERVOIR CAPACITY OVER 50 ACRE-FEET)



74% PRIVATELY OWNED **2738**

- Water companies
- Water user associations
- Ranches, farms
- Individuals
- Corporations
- Mining companies

5% STATE OF MONTANA **170**

- Natural Resources and Conservation (Trust lands and State water projects)
- Fish Wildlife and Parks
- Department of Corrections

<1% PUBLIC UTILITIES **22**

3% LOCAL GOVERNMENT **101**

- Cities
- Counties
- Irrigation districts

14% FEDERALLY OWNED **531**

- Bureau of Reclamation
- US Army Corp of Engineers
- Forest Service
- Bureau of Land Management
- Bureau of Indian Affairs
- Fish and Wildlife Service

3% RESERVATION OWNED **109**

- Fort Belknap
- Fort Peck
- Rocky Boy
- Northern Cheyenne
- Flackfeet
- Crow
- Flathead

WHY DOES IT MATTER WHO OWNS THE DAM? WHO OWNS THE LAND?

Ownership dictates:

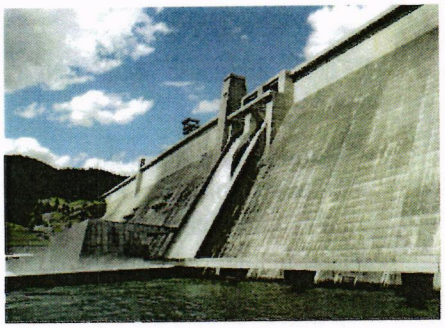
- Rules/standards that must be followed
- Regulatory agency
- Liability and responsibility

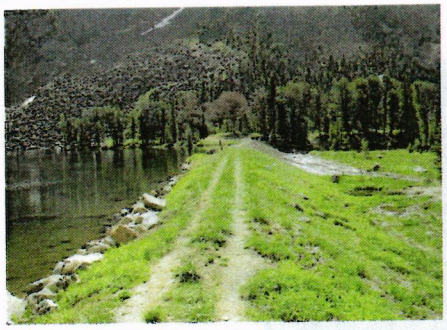
FOR MORE INFORMATION: HTTP://DNRC.MT.GOV/DIVISIONS/WATER/OPERATIONS/DAM-SAFETY

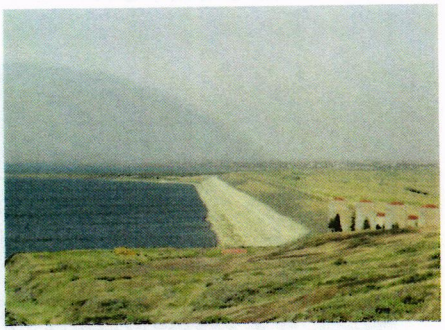
Dams in Montana

FEMA

REGULATION OF DAMS – FEDERAL







US BUREAU OF RECLAMATION (USBR)

- The USBR self-regulates the dams and dikes they own on 13 reservoirs.
- The USBR also regulates dams that are part of irrigation projects under its supervision and several diversion dams.

For more information:
www.usbr.gov/projects

US FOREST SERVICE (USFS)

- The USFS self-regulates the 27 dams they own.
- 85 dams located on USFS property are privately or state-owned. The Department of Natural Resources and Conservation and the USFS are in the process of developing an agreement for efficient joint regulation of these dams. Most of these dams are remote and are generally less than 30 feet high.

US ARMY CORP OF ENGINEERS (USACE)

The USACE self-regulates 2 large dams in Montana (Fort Peck and Libby Dam).

US BUREAU OF INDIAN AFFAIRS (BIA)

The BIA regulates dams located on Indian reservations. This includes 109 dams owned by the reservations, with the exception of one hydropower producing facility that is regulated by the Federal Emergency Regulatory Commission.

The Bureau of Reclamation provides assistance to the BIA when needed.

Dams in Montana

FEMA

REGULATION OF DAMS – FEDERAL (CONTINUED)

US FISH AND WILDLIFE SERVICE (FWS)

- The FWS self-regulates the 26 dams they own.
- Most of these dams are less than 15 feet high, and classified as low hazard, although they can store large amounts of water.

US BUREAU OF LAND MANAGEMENT (BLM)

- The BLM regulates 470 dams that are located on its land in Montana.
- BLM owns some of the dams, others are privately owned. In both cases, BLM provides regulatory oversight
- Most of these dams are located in low population areas and are classified as low hazard.

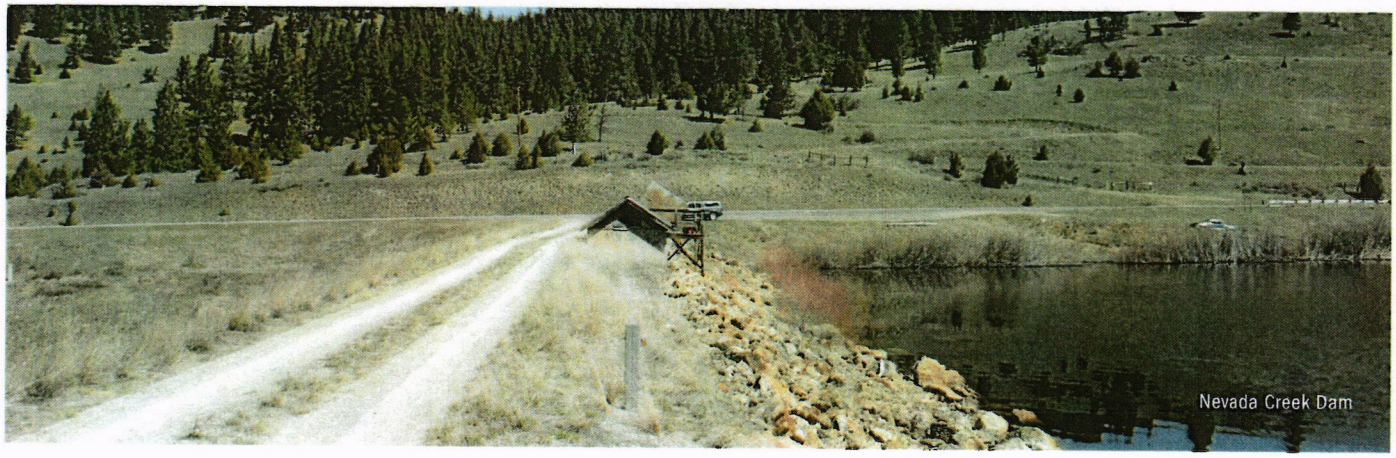
ENVIRONMENTAL PROTECTION AGENCY (EPA)

- Montana has dams located on superfund sites. EPA actively regulates 4 of these dams.
- Although EPA is the lead agency, they work closely with state agencies on dam regulation.

WHAT DOES IT MEAN TO BE SELF-REGULATED?

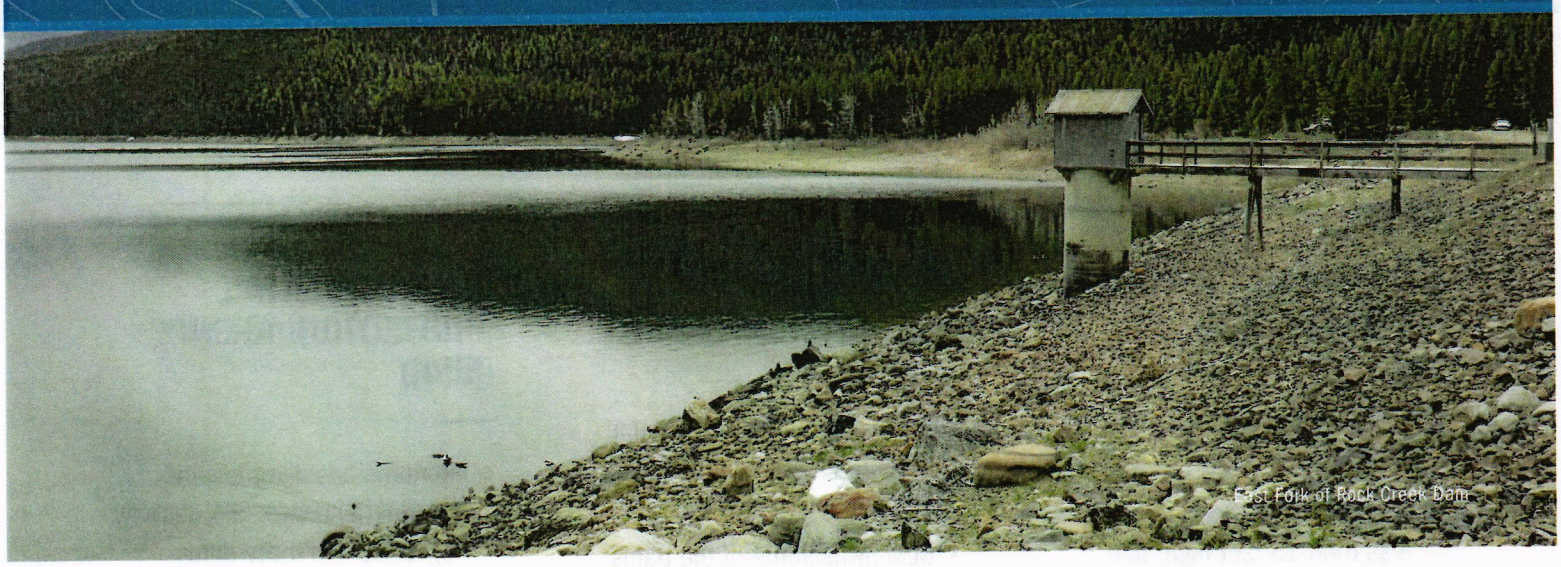
Many Federal agencies manage their own dam safety programs. Dams are held to stringent requirements. Although the requirements vary by agency, they conform to common guidelines referred to as the "Federal Guidelines for Dam Safety."

For More Information: www.fema.gov/federal-guidelines-dam-safety



Nevada Creek Dam

Dams in Montana


East Fork of Rock Creek Dam

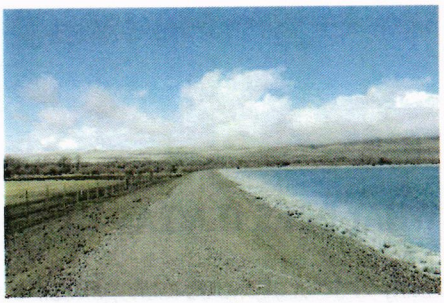
REGULATION OF DAMS – STATE

DEPT. OF NATURAL RESOURCES AND CONSERVATION (DNRC)

Dams in these categories that are regulated by federal agencies or other state agencies are exempt from DNRC oversight.

The exception is any high-hazard dams on forest service property, which are jointly regulated by DNRC and the USFS.

For more information on the DNRC State Dam Safety Program: http://dnrc.mt.gov/divisions/water/operations/dam-safety



DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

DEQ provide regulatory oversight of wastewater pond dams, tailings dams and dams located at the Colstrip facility

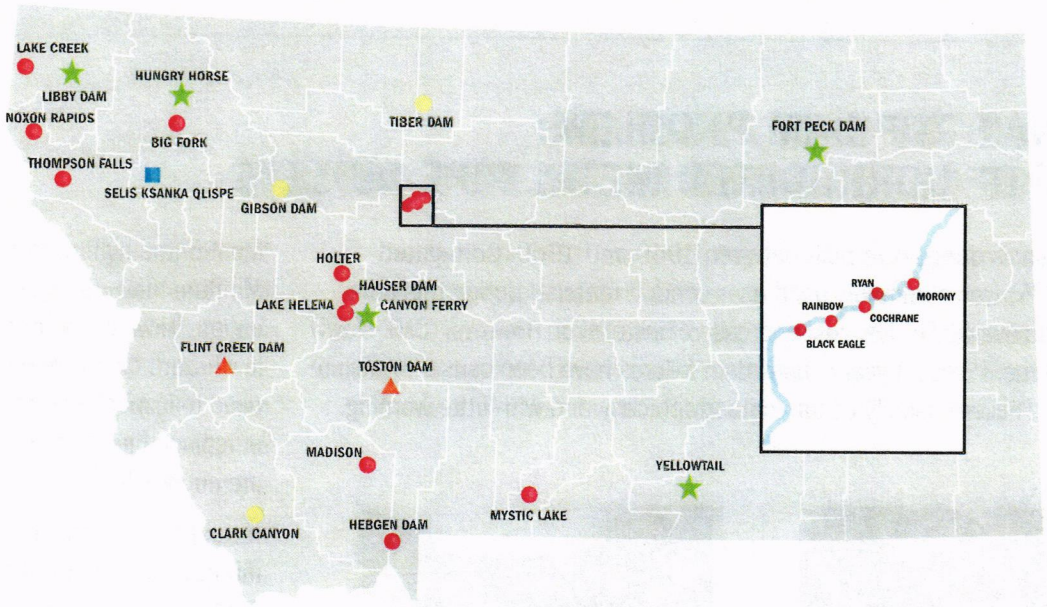
Dams in Montana

FEMA

REGULATION OF HYDROPOWER DAMS

FERC regulates most, but not all, hydropower producing dams. Exceptions include dams owned by the USBR and the USACE that have authority to generate power. Note that not all USBR-owned dams are authorized for hydropower. For these dams, private entities can develop the hydropower. However, these private entities must seek a license from FERC. FERC is known for its stringent design, inspection, operation and maintenance standards.

HYDROPOWER DAMS IN MONTANA:



PRIVATELY OWNED DAMS
Privately Operated Hydropower
FERC Regulated

STATE/LOCALLY OWNED DAMS
State/Locally Operated Hydropower
FERC Regulated

FEDERALLY OWNED DAMS
Federally Operated Hydropower
Self-Regulated

FEDERALLY OWNED DAMS
Privately Operated Hydropower
FERC Regulated

FEDERALLY OWNED DAMS
Reservation Operated Hydropower
FERC Regulated

Dams in Montana

FEMA

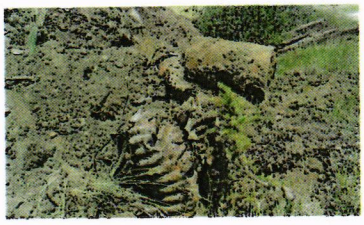
DAM INSPECTIONS MAKE THE DIFFERENCE

Montana's dams are immensely safer than there were 30 years ago. Inspections identify developing problems long before they lead to an incident or failure. Inspections identify maintenance needs and operational problems and provide dam owners guidance on how to address. Inspections help the dam owner and engineer become familiar with the dam and subsequently more aware of an unusual seep, slump or crack.

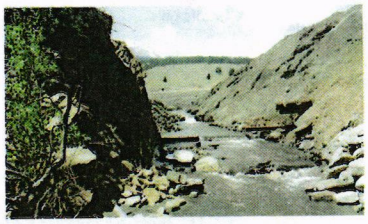
It is exceedingly rare for properly inspected and maintained dams to fail.

MONTANA'S TOP DAM PROBLEM: FAILURE OF CORRUGATED METAL PIPE OUTLETS

Many of Montana's dams were built between 1940 and 1960. Corrugated Metal Pipe (CMP) was commonly used as a conduit material during this time period due to its availability, low cost and ease of installation. However, CMP slowly corrodes over time. In recent years, many dam failures have been caused by failure of CMP outlets. Failure usually occurs catastrophically and with little warning.



Shale Creek Dam, Petroleum Co. failed catastrophically in 2004 No serious downstream damage, however dam owner loss season of irrigation water



Phantom Dam, Choteau Co. failed in 2011, Located in a remote area, no damage downstream

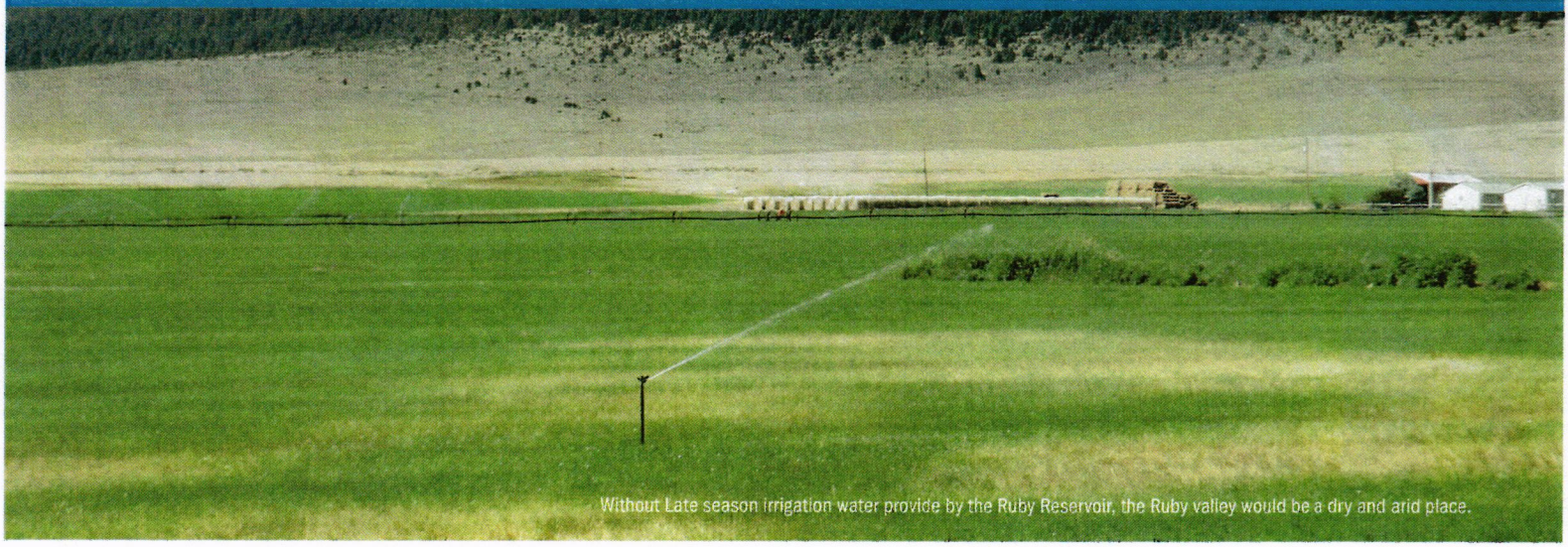
Most of the high hazard dams in Montana have rehabilitated their aging outlets. However, owners of many small low hazard dams are not aware of the need to inspect and if necessary repair or replace their outlets, as inspections are not required.

In response to this need, DNRC initiated a number of actions using FEMA National Dam Safety Act Assistance to States funding to address this growing concern including:

- Dam Owner Workshops
- Purchase of Outlet Inspection Equipment that dam owner can borrow
- Educational Tools and Information guides

Dams in Montana

FEMA



Without Late season irrigation water provide by the Ruby Reservoir, the Ruby valley would be a dry and arid place.

The many irrigation reservoirs in the state benefit wildlife and often provide recreational opportunities for the public. Irrigation reservoirs also provide an often-overlooked bonus: late season stream flow and related groundwater recharge and return flow. Montana would look very different in August without these irrigation reservoirs.

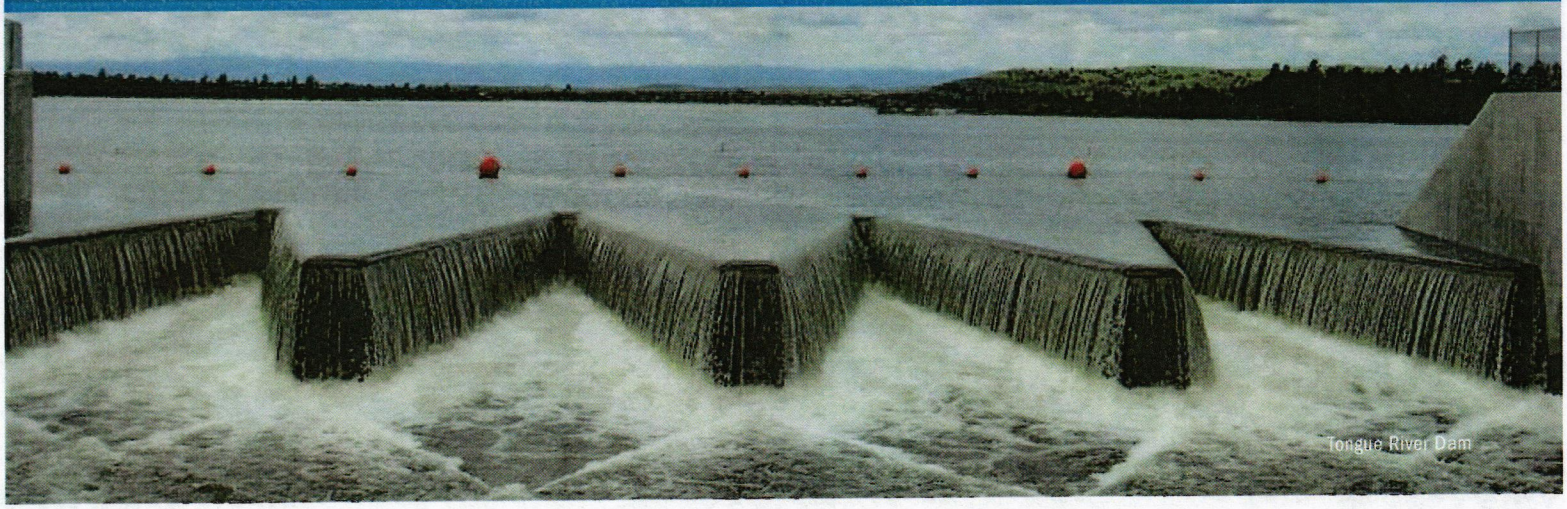
MONTANA'S MULTIPLE USE RESERVOIRS

MONTANA RESERVOIRS' PRIMARY PURPOSE:

871 IRRIGATION	**19** HYDROPOWER	**2,285** STOCK/SMALL FARM POND	**29** FISH & WILDLIFE	**80** RECREATION
81 FLOOD CONTROL	**13** MULTIPURPOSE	**8** TAILINGS	**83** WATER SUPPLY	**202** OTHER

Dams in Montana

FEMA



Tongue River Dam

FREQUENTLY ASKED QUESTIONS

ARE THERE MANY DAM FAILURES IN MONTANA?

Yes, during flood events many small pond dams fail. However, often the only one aware of the failure is the dam owner. During the most recent flooding in counties along the Musselshell River, data suggests that over 50 small stock pond dams failed. In general, the small pond dams do not contain much water and, as a result, when they fail little or no damage occurs.

There have been recent cases where larger dams have failed, primarily due to the deterioration of corrugated metal pipe outlets. None of these dams was classified as high hazard and there was no loss of life or significant property damage. The biggest problem with these failures was the loss of a season of irrigation water, which can be significant impact to the water users. There was one case where the dam failure flooded a railroad, which resulted in a temporary shutdown of a major railroad line and significant costs to the dam owner.

In 1964, several dams failed on the Rocky Mountain Front during a large rain on snow event causing loss of life.

WHY ARE THERE SO MANY DIFFERENT REGULATORY AGENCIES?

Federal agencies are required to enforce federal laws for dams they own or are located on their property. Dams not subject to federal requirements fall under the regulatory authority of the state.

WHO IS RESPONSIBLE IF A DAM FAILS?

State law is clear: the owner of the dam is responsible to maintain their dam in a safe condition, and should it fail, the dam owner may be held liable for damages.

Regulatory agencies provide an important role in educating dam owners about their risks and ensuring inspections, maintenance and repairs are done in a timely manner.